

CLAIMS

1 - 8. (cancelled)

9. (currently amended) The method of claim 8 35 further comprising:
scaling each of the multipath interference estimates by a respective one in a set of
multipath interference estimate scalars;
combining the multipath interference estimates after scaling by the set of multipath
interference estimate scalars to form a combined multipath interference estimate;
combining the signals of interest to form a combined signal of interest; and
subtracting the combined multipath interference estimate from the combined signal of
interest.

10. (currently amended) The method of claim 9 further comprising:
observing a characteristic dependent upon the signals of interest; and
setting values of the set of multipath interference estimate scalars based on the
characteristic so as to minimize overall multipath interference in the combined signal
of interest.

coherently combining the signals of interest to form a combined signal of interest;
individually scaling each of the multipath interference estimates with a respective one of
a set of multipath interference estimate scalars;
combining the multipath interference estimates after scaling by the set of multipath
interference estimate scalars to form a combined multipath interference estimate;
and
subtracting the combined multipath interference estimate from the combined signal of
interest to reduce multipath interference in the combined signal of interest.

11. (cancelled)

12. (currently amended) The method of claim 44 10 further comprising:
monitoring the combined signal of interest after subtraction of the combined multipath interference estimate; and
setting values of the set of multipath interference estimate scalars based on monitoring the combined signal of interest to minimize a remaining amount of multipath interference in the combined signal of interest after subtraction of the combined multipath interference estimate.

13. (previously presented) The method of claim 12 wherein adjusting values of the set of multipath interference estimate scalars based on monitoring the combined signal of interest to minimize a remaining amount of multipath interference in the combined signal of interest after subtraction of the combined multipath interference estimate comprises:

determining a multipath interference power value and a residual interference power value for each interference estimate scalar in the set of multipath interference estimates relevant to corresponding ones of the multipath interference estimates;
and
setting a value of each multipath interference estimate scalar based on a ratio involving the respective multipath interference power value and residual interference power value;

wherein the ratio involving the multipath interference power value and residual interference power value is adjusted to insure that the residual interference power value is always less than the multipath interference power value.

14 – 20 (cancelled).

21. (currently amended) The RAKE receiver of claim 20 36 wherein there are L primary RAKE fingers corresponding to L selected multipath signals, and up to $(L - 1)$ multipath interference estimators for each one of the L primary RAKE fingers, each of the up to $(L - 1)$ multipath interference estimators corresponding to a given one of the L primary RAKE fingers adapted to estimate the interference in the selected multipath signal corresponding to the given primary RAKE finger arising from a remaining one of the L selected multipath signals.

22. (currently amended) The RAKE receiver of claim 20 36 wherein the RAKE receiver is further adapted to determine the power-scaling value used in each of the at least one multipath interference estimators based on propagation channel coefficients determined for relevant ones of the plurality of multipath signals.

23. (currently amended) The RAKE receiver of claim 20 36 wherein the RAKE receiver is further adapted to determine the channel scaling value used in each of the at least one multipath interference estimators based on propagation channel coefficients determined for the first and second multipath signals relevant to a given one of the at least one multipath interference estimator.

24. (currently amended) The RAKE receiver of claim 20 36 further comprising a set of multipath interference-scaling multipliers, wherein individual ones of the multipath interference-scaling multipliers correspond to respective ones of the multipath interference estimates, and wherein each multipath interference-scaling multiplier is adapted to multiply the respective multipath interference estimate with a particular multipath interference scale value before the multipath interference estimates are subtracted from the signals of interest.

25 – 28 (cancelled)

29. (currently amended) The mobile terminal of claim 28 37 wherein there are L primary RAKE fingers corresponding to L selected multipath signals, and up to $(L - 1)$ multipath interference estimators for each one of the L primary RAKE fingers, each of the up to $(L - 1)$ multipath interference estimators corresponding to a given one of the L primary RAKE fingers adapted to estimate the interference in the selected multipath signal corresponding to the given primary RAKE finger arising from a remaining one of the L selected multipath signals.

30. (currently amended) The mobile terminal of claim 28 37 wherein the RAKE receiver is further adapted to determine the power-scaling value used in each of the at least one multipath interference estimators based on propagation channel coefficients determined for relevant ones of the plurality of multipath signals.

31. (currently amended) The mobile terminal of claim 28 37 wherein the RAKE receiver is further adapted to determine the channel scaling value used in each of the at least one multipath interference estimators based on propagation channel coefficients determined for the first and second multipath signals relevant to a given one of the at least one multipath interference estimator.

32. (currently amended) The mobile terminal of claim 28 37 further comprising a set of multipath interference-scaling multipliers, wherein individual ones of the multipath interference-scaling multipliers correspond to respective ones of the multipath interference estimates, and wherein each multipath interference-scaling multiplier is adapted to multiply the respective

multipath interference estimate with a particular multipath interference scale value before the multipath interference estimates are subtracted from the signals of interest.

33. (new) A method of reducing multipath interference in a received composite signal comprising a plurality of multipath signals, the method comprising:

- correlating the received composite signal with a PN code sequence at a time offset corresponding to a first one of the plurality of propagation paths to recover a signal of interest from a first multipath signal;
- multiplying the signal of interest by a first channel coefficient determined for the first one of the plurality of propagation paths to adjust a gain and phase of the signal of interest;
- correlating the received composite signal with the PN code sequence at a time offset corresponding to a delay difference between the first multipath signal and a second multipath signal to generate a multipath interference estimate;
- multiplying the multipath interference estimate by the first channel coefficient and by a second channel coefficient determined for the second one of the plurality of propagation paths to adjust a gain and phase of the multipath interference estimate;
- and
- subtracting the multipath interference estimate from the signal of interest to reduce multipath interference.

34. (new) A method of reducing multipath interference in a received composite signal comprising a plurality of multipath signals, the method comprising:

- correlating the received composite signal with a PN code sequence at a time offset corresponding to a first one of the plurality of propagation paths to recover a signal of interest from a first multipath signal;

correlating the received composite signal with the PN code sequence at a time offset corresponding to a delay difference between the first multipath signal and a second multipath signal to generate a multipath interference estimate;

multiplying the multipath interference estimate by an interference scaling factor determined by a ratio of multipath interference power in the signal of interest arising from the second multipath signal and residual interference power in the multipath interference estimate introduced during determination of the multipath interference estimate; and

subtracting the modified multipath interference estimate from the signal of interest to reduce multipath interference.

35. (new) A method of reducing multipath interference in a received composite signal comprising a plurality of multipath signals, the method comprising:

correlating the received composite signal with a PN code sequence at relative time offsets corresponding to path delays associated with selected ones of the plurality of multipath signals to recover a signal of interest from each one of the selected multipath signals;

determining multipath interference estimates for each one of the selected multipath signals caused by remaining ones of the selected multipath signals by correlating the received composite signal at time offsets corresponding to path delay differences between the multipath signals by, for determining multipath interference estimates for a first one of the selected multipath signals caused by a second one of the selected multipath signals,

(a) for all but the second multipath signal, generating a correlation output by correlating the received composite signal with the PN code sequence at a time offset corresponding to a current one of the selected multipath signals offset by a

delay difference between the first and second ones of the selected multipath signals;

- (b) compensating each correlation output using channel coefficients determined for the current one of the selected multipath signals;
- (c) coherently combining each correlation output to form a raw estimate of the interference in the first multipath signal caused by the second multipath signal;
- (d) multiplying the raw estimate by a power-scaling factor to adjust a power of the raw estimate; and
- (e) multiplying the raw estimate by a channel-scaling factor to scale the raw estimate with respect to the first and second multipath signals to form the interference estimate for multipath interference in the first channel with respect to the second channel; and

subtracting the multipath interference estimates determined for the selected ones of the multipath signals from the signals of interest recovered from the selected ones of the multipath signals.

36. (new) A RAKE receiver comprising:

at least one primary RAKE finger, each adapted to recover a signal of interest from a selected multipath signal within a received composite signal comprising a plurality of multipath signals by correlating the received composite signal with a PN code at a time offset corresponding to the selected multipath signal;

at least one multipath interference estimator, each adapted to generate a multipath interference estimate for a corresponding one of the at least one primary RAKE finger caused by a remaining one of the plurality of multipath signals with respect to the selected multipath signal from which the corresponding primary RAKE finger recovers the signal of interest, each said multipath interference estimator comprising,

- (a) a plurality of secondary RAKE fingers, each adapted to generate an individual estimate of multipath interference in a first one of the plurality of multipath signals arising from a second one of the plurality of multipath signals by correlating the received composite signal with the PN code sequence at time offset corresponding to a selected one of the plurality of multipath signals shifted by a relative delay difference between the first and second multipath signals, wherein the selected multipath signal is not the second multipath signal;
 - (b) a first multiplier in each secondary RAKE finger adapted to multiply the individual estimate of multipath interference by a channel coefficient determined for the selected multipath signal on which the secondary RAKE finger operates;
 - (c) a combining circuit for combining the output from each secondary RAKE finger within the multipath interference estimator to form a raw multipath interference estimate;
 - (d) a second multiplier adapted to multiply the raw multipath interference estimate by a power-scaling value to form a power-scaled raw multipath interference estimate;
 - (e) a third multiplier adapted to multiply the power-scaled raw multipath interference estimate by a channel-scaling value to form the multipath interference estimate output by the multipath interference estimator; and
- a subtraction circuit for subtracting the multipath interference estimates generated by the at least one multipath interference estimator from the signals of interest recovered by the at least one primary RAKE finger.

37. (new) A mobile terminal comprising:

a user interface adapted to allow a user to control the mobile terminal, and to input local speech signals for transmission and hear remote speech signals recovered from received signals;

a transmitter adapted to transmit the local speech signals to a base station via an RF transmit signal; and

a receiver adapted to recover the remote speech signals from a received composite signal; said receiver comprising:

- at least one primary RAKE finger, each adapted to recover a signal of interest from a selected multipath signal within a received composite signal comprising a plurality of multipath signals by correlating the received composite signal with a PN code at a time offset corresponding to the selected multipath signal;

- at least one multipath interference estimator, each adapted to generate a multipath interference estimate for a corresponding one of the at least one primary RAKE finger caused by a remaining one of the plurality of multipath signals with respect to the selected multipath signal from which the corresponding primary RAKE finger recovers the signal of interest, each said multipath interference estimator comprising,

- (a) a plurality of secondary RAKE fingers, each adapted to generate an individual estimate of multipath interference in a first one of the plurality of multipath signals arising from a second one of the plurality of multipath signals by correlating the received composite signal with the PN code sequence at time offset corresponding to a selected one of the plurality of multipath signals shifted by a relative delay difference between the first and second multipath signals, wherein the selected multipath signal is not the second multipath signal;

- (b) a first multiplier in each secondary RAKE finger adapted to multiply the individual estimate of multipath interference by a channel coefficient determined for the selected multipath signal on which the secondary RAKE finger operates;
 - (c) a combining circuit for combining the output from each secondary RAKE finger within the multipath interference estimator to form a raw multipath interference estimate;
 - (d) a second multiplier adapted to multiply the raw multipath interference estimate by a power-scaling value to form a power-scaled raw multipath interference estimate;
 - (e) a third multiplier adapted to multiply the power-scaled raw multipath interference estimate by a channel-scaling value to form the multipath interference estimate output by the multipath interference estimator; and
- a subtraction circuit for subtracting the multipath interference estimates generated by the at least one multipath interference estimator from the signals of interest recovered by the at least one primary RAKE finger.